A Boat Buyer's 'Top Ten' Guide to a Pre-Offer Evaluation Part II

Text and photos copyright © 2018 Steve D'Antonio Marine Consulting, Inc.

From the Masthead: Simplicity vs. Reality

Not long ago I met with a potential client who was excited to discuss a vessel he wanted to have built. During our meeting he shared a list of items he wanted to incorporate into the project, forward looking sonar, water makers (two of them), ultrasonic anti-fouling, fuel polishing, a diesel furnace (with heated head soles), stabilizers and hydraulic thrusters, and a vessel monitoring system, to name just a few. I took notes as we talked, and while doing so thought, "This is all pretty common gear, it should be straightforward to properly incorporate it into this design, and make for a very nice systems package". Then the he dropped the bomb, "I read a blog post by a cruiser who said it's very important to keep the vessel as simple as possible, so I want to make sure we do that as well".

Every vessel owner is familiar with the 'keep it simple' phrase, and I see it on the forums in which I participate, in magazine articles, and I hear it invoked at boat shows by buyers and sellers alike. While it has merit, there's just one problem, few people truly understand exactly what it means; "simple", after all, has a range of definitions. We live in a world that long ago left behind roll-up windows and push lawnmowers; and embraced automatic lane keeping, blind spot cameras, individual driver and passenger climate

controls, integrated household pest control, intelligent thermostats, video door bells, smart phone-controlled gas fireplaces, and touch activated faucets. While we may genuinely believe simplicity is better, because the things you *don't* have *can't* break, most buyers and owners simply aren't prepared to spend a lot of money on a boat, only to *not* have the things they want, and to which they've become accustomed.

Having said that, one of the primary emotions I encounter in new boat owners is a sense of being overwhelmed, 'there's so much to learn just to use the boat, and that doesn't include troubleshooting and repair' is a sentiment I hear often. It's true, today's cruising vessels are complex, it's virtually unavoidable; however, it should be noted, some are unnecessarily complex and some manage complexity far better than others. If you had outboard motors, minibikes, and cars you fixed up as a kid, or if you helped your dad (or mom in some cases) work on the washing machine and change mufflers in the family car, then your threshold for things mechanical, and for systems in general, is almost certainly higher. For the mechanical and electrical engineers among us, well, you have a significant head start.

If, however, you aren't comfortable with tools and things mechanical, if you don't have a favorite ratchet, wire stripper, or caliper, one you've owned since you were a teenager, then your threshold for complexity will be lower, and you'll need to plan for that. While complexity can be done well, and not so well, where boat building and systems are concerned (I wrote an article on this very subject a few years ago), this, your gearhead quotient, must be kept in mind when you are searching for, building or outfitting your vessel. For those who have less experience with systems and hands-on service, there are things you can do to improve a vessel's user and service friendliness, and your peace of mind.

- Ensure every valve, switch, fuse and circuit breaker is

clearly labeled.

- For a new vessel, make certain it comes with a detailed owner's manual (make the sale contingent upon this detail, ask to see a copy), which includes drawings for electrical, fuel, potable water, sanitation and other key systems.
- Make certain you can perform key engine tasks, including primary and secondary fuel filter, impeller and belt replacement (I covered this subject in a recent column).
- Get systems and troubleshooting training by attending training seminars and workshops; learn how to use a multimeter.

This month's eMagazine feature article is part two of a two part series; it covers the subject of conducting a pre-offer evaluation of a vessel. I hope you find it both interesting and useful. I'll be headed to China and Taiwan in October. If you'd like to chat with me about inspecting a vessel you are having built, or visiting a yard you are considering for a new build, please feel free to contact me.

A Boat Buyer's 'Top Ten' Guide to a Pre-Offer Evaluation Part II

(This article is based on a lecture delivered at the Fort Lauderdale Boat Show)

Following these steps can make navigating the vessel offer and survey process less risky, less stressful and less costly.

In last month’s eMagazine feature I discussed the importance of, and value in, conducting a pre-offer evaluation. This included areas such as compliance with recognized standards and installation instructions, construction material options, tanks and electrical systems. In this, the second and final segment of this series, I’ll review vessel maintenance, record keeping and management programs; running gear and alignment issues; fluid analysis; raw water plumbing and seacocks; and damage disclosure and warranties.

6. Vessel Maintenance Management Programs

Several years ago an individual contacted me and asked if he could schedule a meeting, to run an idea by me, one for a new marine business he was contemplating. I agreed to give him half an hour, at a boat show I was planning on attending. I get these calls often, and while I like to remain open-minded,

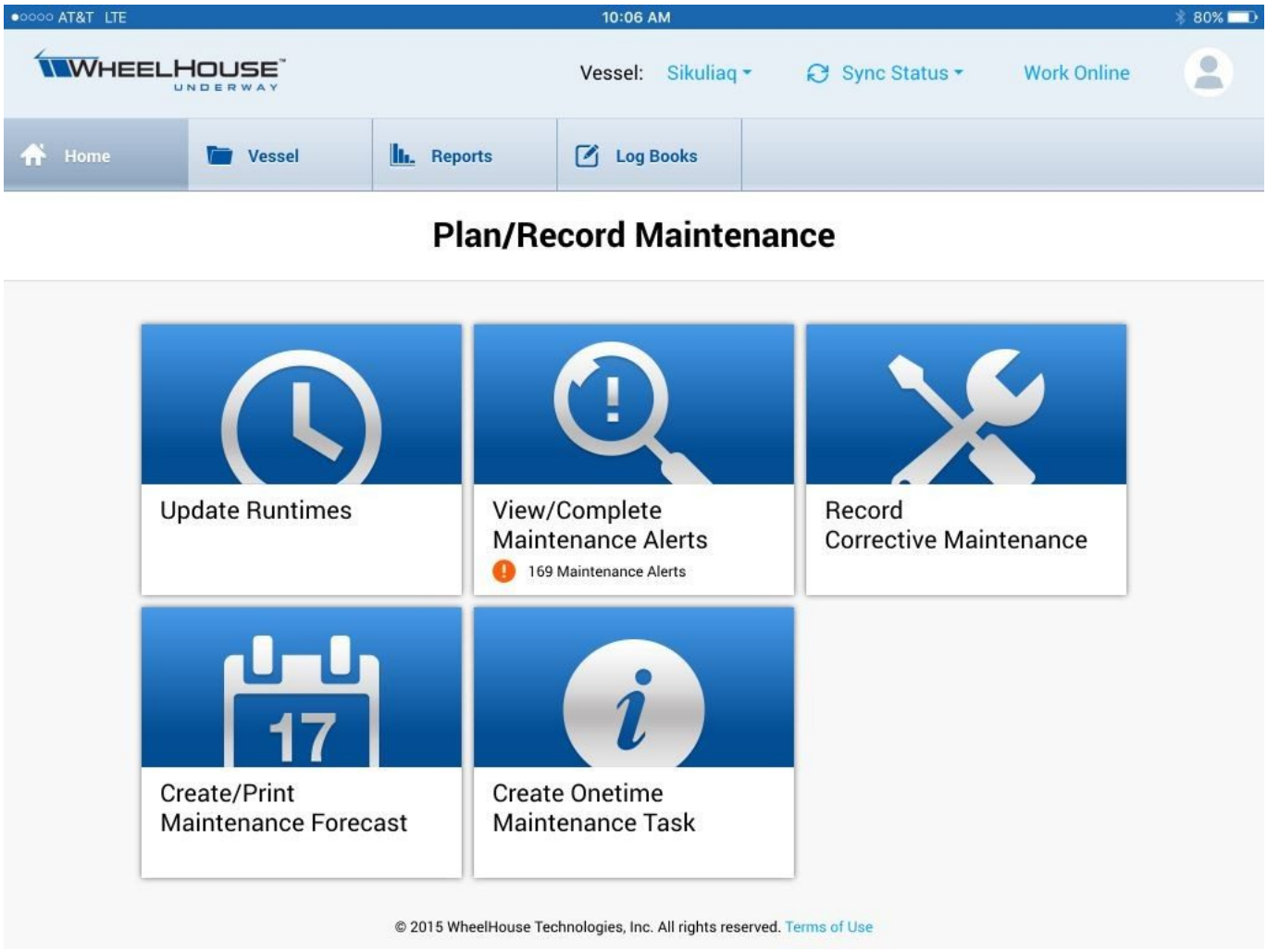
many of the ideas are wildly impractical. In my opinion this one was no different; it involved distilling, from hundreds of equipment owner's manuals, the critical service protocols and intervals, and then inputting that into a program that would alert users when preventive maintenance was needed. The task seemed gargantuan to me, accessing all the information, and then accurately entering the data would be, in my estimation, overwhelming. I told him it had been tried, without success, but wished him luck.

Some deferred maintenance is difficult to identify without disassembly; ultimately, however, it manifests itself either during the survey or, worse, after you've taken possession of the vessel.

Two years later I wrote an article, in which I happily admitted, in this case, that I could not have been more mistaken. The company was SeaKits, now WheelHouse Technologies, and the program they offered actually worked,

very well. Today they support hundreds of recreational, commercial and institutional vessels with their marine maintenance program. Today several firms offer a similar product, which is good for boat owners, as competition brings out the best in any business. Among other things, WheelHouse, and other programs like it, offers users peace of mind in knowing that their vessel's systems are being properly maintained, and it helps users keep track of what's been done and when. A few years ago a reader contacted me with a tale of woe, the windlass on the vessel he'd owned for several years failed; he was distraught that it had done so with little warning and seemingly for no reason. I inquired about service and his response spoke volumes, "Service, what do you need to do to a windlass except wax it?" In fact the windlass had failed because it had *never* been serviced, never disassembled, cleaned and greased; the oil level was never checked. When I alerted him to this he said, "I had no idea this had to be done, if I did I would have done it". That's a common refrain after a failure, 'I had no idea I was supposed to…" fill in the blank.


AT&T
1:18 AM
WHEELHOUSE
UNDERWAY
Vessel: Demo Vessel
Sync Status
Work Online
Home
Vessel
Reports
Log Books
Plan/Record Maintenance
Update Runtimes
View/Complete
Maintenance Alerts
41 Maintenance Alerts
Record
Corrective Maintenance
17
Create/Print
Maintenance Forecast
Create Onetime
Maintenance Task
© 2015 WheelHouse Technologies, Inc. All rights reserved. Terms of Use



Vessels with up to date maintenance programs are nearly always more reliable, and initially less costly to own because deferred maintenance issues are significantly reduced. Such vessels are more valuable and should be more attractive to buyers, and for sellers.

Pre-owned vessels that have a marine maintenance program, *one that has been utilized and whose tasks are up to date*, is very unlikely to suffer from the aforementioned "spontaneous" windlass failure, and others like it. The value of this sort of upkeep is considerable; when I perform inspections on such vessels, the defects list is invariably shorter than similar vessels, those that have not had the benefit of being proactively maintained. If you are purchasing a new vessel, strong consideration should be given to implementing WheelHouse or an equivalent, for two reasons. One, it makes for an inherently more reliable vessel, with fewer unplanned

yard visits. Two, it increases the vessel's value when to comes time to list her for sale. You can learn more about WheelHouse/SeaKits in this article

7. Running Gear

A few years ago I inspected a vessel for a client; during the sea trial I felt a distinctive vibration, one I'd not encountered previously on the same model from this manufacturer. Upon hauling the vessel I was certain I'd find a bent propeller blade, or a lobster pot wrapped around the shaft, but there was nothing, props, shafts, struts, rudders, stabilizer fins, everything checked out just as it should. Still, I knew the vibration wasn't typical for this vessel. I noted my observations in my report, which the seller questioned, indicating he'd owned the vessel from new and had never run aground or hit anything (there's a familiar and apropos axiom for this claim, 'there are cruisers who have run aground [and hit things], and those who will'). Whether or not that was true, there was no evidence of this.

Furthermore, he denied there was a vibration. While some vibration is subtle and subjective, this was unmistakable, joinerwork in the aft crew quarters was literally buzzing in the resonant rpm range. Having said that, if you'd driven a car with unbalanced tires all your life you may never notice just how bad it was, until the day came where you drove a car whose tires *were* balanced, the difference would be immediately apparent. On many occasions I've encountered vessel owners who could not feel a vibration, hear a rattle, feel sloppy steering, or smell an odor, because it was all they'd ever known. I made a suggestion to my client, 'If the vessel meets your needs in all other major categories, have an acknowledged running gear alignment professional evaluate the system, the cost will be minimal, and well worth it'. He did; the problem was insidious but undeniable, the pilot bushings of both propeller shaft couplings were off center, which meant that the shafts were revolving around, rather than rotating on, an

axis. The installation of new couplings, fit and faced, eliminated the vibration entirely. The sale proceeded, and the seller paid for the repairs once the problem, and results, were clearly demonstrated. Furthermore, while ignorance may be bliss, the seller was retroactively furious that he'd lived with the problem for so long.


Starrett
AMERICAN MADE


Prop Scan Bar Graph
PD1 Group - 7 Units - Inches
Design Mean - 70 AZ
35.032 ins
Measured Mean
34.976 ins
Deviation
-0.16%
(a) 100.0%
(b) 100.0%
(c) 100.0%
(d) 100.0%
100.0%
Non Conforming Radii
(s) 100.0%
(d) 100.0%
.4
35.399
35.240
35.226
35.500
35.405
.5
37.121
36.798
36.798
36.974
36.835
.6
37.378
37.302
37.150
37.226
37.311
.7
36.776
36.744
36.776
36.760
36.862
.8
35.471
35.324
35.269
35.306
35.507
.9
32.578
32.317
32.526
32.422
32.572
.95
30.795
30.594
30.795
30.755
30.735
35.074
34.903
34.934
34.992
Prop Scan
040880F
17/11/04
Class 1 CTD F
ISO 484/2
34.000
4 x 7 LH
ROLLA METRIC

Shaft alignment, propeller condition, shaft tolerances, all of these can have an effect on a vessel's operating characteristics, efficiency and reliability.

Ask if the vessel you are considering has had any shaft, bearing or propeller repairs during the seller's ownership. If so ask for details and receipts. Has the shaft *and* engine alignment ever been checked, have the propellers been scanned and adjusted recently? If so, ask to see the scan reports, for most vessels it makes sense for props to be brought into ISO Class 1 compliance. This two part article on engine and shaft alignment, as well as this two part article on propellers and propeller service may be useful in learning more about this process. Related to this subject, as part of your evaluation process, ask of the vessel has had any major mishaps, flooding, fire, collision, lightning strikes, major engine failures or replacement etc. In most regions sellers are required to disclose this information, particularly if asked.

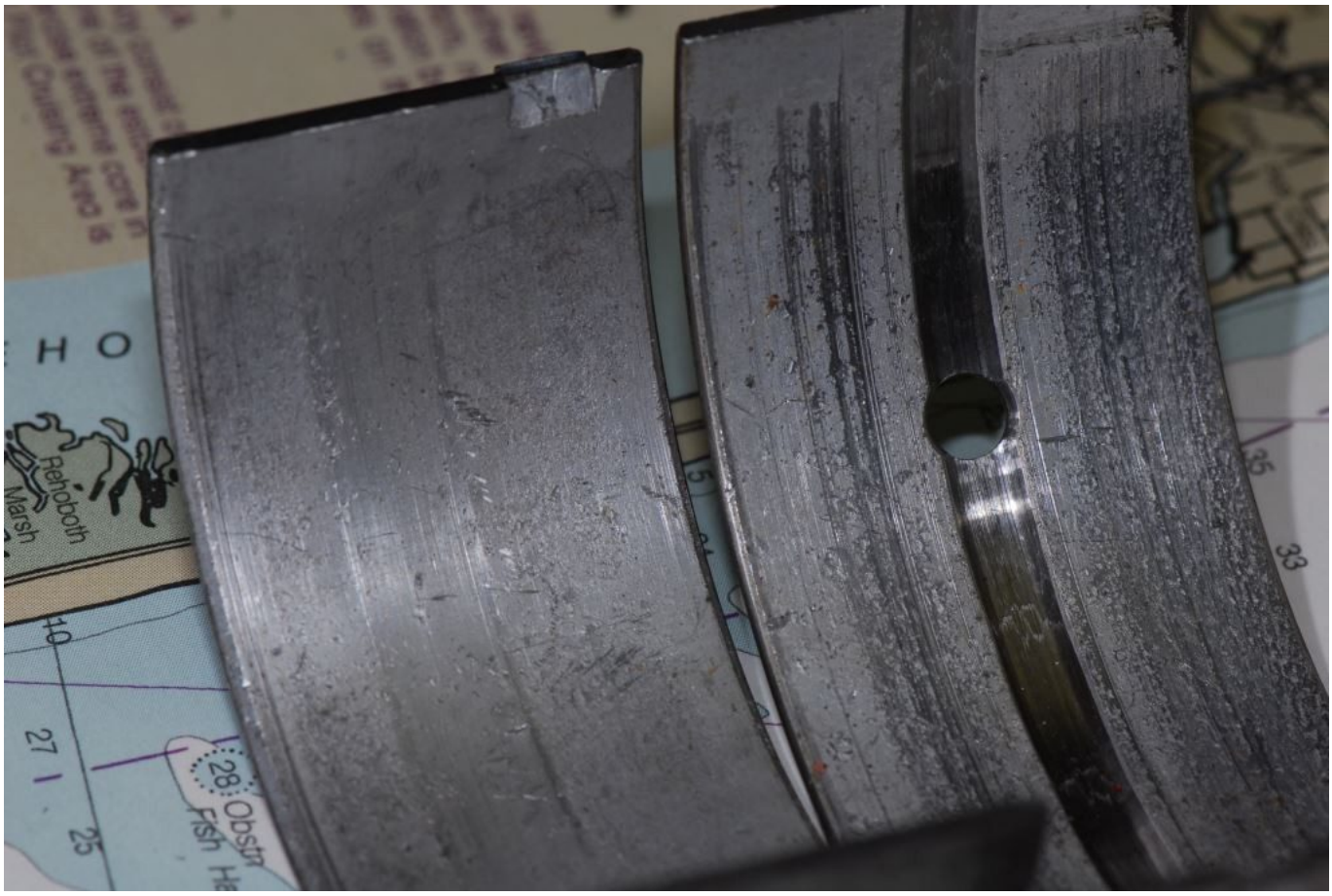
8. Fluid Analysis

I’ve likened fluid analysis to a mechanic’s crystal ball; it’s a look into the sole of machinery, including engines, gensets, power steering and hydraulic stabilizers and thrusters. In the right hands, analysis reports are a valuable tool that can be used by buyers and sellers alike. The fluids that can be tested include crankcase and transmission oil, hydraulic fluid and coolant. Some will say that the value of fluid analysis is limited unless there is a trend to be followed, unless testing has been carried out on a regular basis. While that’s true to some extent, I’d argue against that logic as an overall concept, I’ve conducted hundreds of analyses, on a one time basis, and in many cases they definitively and accurately identify noteworthy issues.

Analyzing key fluids such as crankcase oil, transmission and hydraulic fluid can yield invaluable, and otherwise undetectable, information about some of a vessel’s most

expensive equipment.

In a recent case, a client carried out oil analysis on a vessel equipped with twin diesel engines. The iron content on one engine showed 190 parts per million, while the other was 34 parts per million. The sharp disparity between the two engines was cause for concern. The oil was changed, the engines run for 10 hours and the test repeated, and still one engine's iron content remained abnormally high even when taking into account residue. The seller chalked it up to the vessel having not been used much, which generated rust inside the crankcase, but if that logic were accurate then both engines should have shown high iron content. Ultimately the seller arranged to have the cylinders bore-scoped. The results were definitive; the cylinder walls on the engine whose iron content was high were noticeably pitted. A subsequent compression test confirmed the issue, the pitted cylinders yielded below normal compression readings. The mystery was solved, and the analysis proved accurate and telling. In spite of stories like this, many still do not place a great deal of faith in fluid analysis, citing the need for "trending", and to some extent I understand their wariness. There are many ways fluid analyses can be misinterpreted, which could in turn scupper an otherwise sound sale. I've seen this occur as a result of poor oil sampling technique, where the pick-up tube is pushed too far into the dipstick tube for instance, and dragged across the bottom of an oil pan, dredging up years' worth of sediment; a sure fire means of sending any analysis lab's computer's into tilt mode.



Worn components, such as engine bearings like those shown here, are virtually impossible to detect without oil analysis.

On the other hand, a miss-read fluid analysis report, which includes incorrect data, could give the all clear for a sale, when in fact an underlying problem exists. I encountered just such a case recently. I reviewed an analysis report for a client in the midst of a purchase, all the bars were green, and he believed my review was, therefore, perfunctory, saying "it's all green so what could be wrong?" In reviewing the report, however, I noticed that the mechanic who took the sample, and completed the form that accompanied it, had inadvertently transposed the lube and unit times, the number of hours on the oil and the number of hours on the engine respectively, the latter had over 1,000 hours on the "clock" (disappointingly, the lab did not catch this gross error). If the oil was genuinely that old, its contamination threshold would be very high, and virtually nothing would cause it to

drive boxes on the report into the yellow or red zone. Once the numbers were corrected, and the report rerun (the oil does not have to be retested to make a correction of this sort), the analysis yielded red warning signs, identifying high aluminum, iron and chrome, an indication of a piston, cylinder and/or ring problem. Ultimately, there is value to purchasing a vessel that has had regular fluid analysis. It is indicative of a conscientious owner, and it affords the buyer additional peace of mind. If the seller is willing to make available copies of reports, take the time to review these; if you don't know how to interpret reports (as the above story illustrates, red, yellow and green bars alone should never be relied upon as an interpretive tool), find someone who does and ask for assistance. Some analysis labs offer training, as does an outfit called Noria, they hold training sessions around the country, as well as online. I've participated in formal fluid analysis training and consider it money well-spent; without formal education in analyzing analysis reports, you are at the mercy of a mechanic's, one who may have no formal training, interpretation, or the yellow, red and green bars.

While any fluid analysis can be valuable, vessels that have been subject to regular testing offer buyer's added peace of mind; ask to see the reports of a vessel you are considering.

For all but new vessels, a pre-purchase survey, when you reach that stage, should include a full round of fluid analysis, including crankcase oil, transmission and hydraulic fluid and coolant; this applies to propulsion engines and gensets alike. For more on fluid analysis, see this overview article and this SDMC instructional video and you can read a more detailed account of fluid analysis here

9. Seacocks and Raw Water Plumbing

Keeping water from entering a vessel is among the highest of priorities, and no place is this more important than in below the waterline plumbing, including through hull fittings, and seacocks. The rate at which water can enter a vessel in the

event of a failed seacock should not be underestimated; few bilge pump systems can contend with even a single, small seacock breach. The standards established by the American Boat and Yacht Council (ABYC), for seacock installations are clear and comparatively brief. Each seacock installation must be capable of withstanding exposure to 500 lbs of static force, at its most vulnerable, i.e. most inboard, location without leaking or failure per se. Additionally, seacock plumbing must utilize compatible threads. In other words, parallel or NPS threads found on nearly all through hull fittings must *not* be mated, as they so often are, to tapered or NPT, threads found on many inline ball valves (purpose-made seacocks utilize NPS threads, and are thus fully compatible with through hull fittings). This is an all too common violation encountered on pre-owned as well as new vessels. The use of such incompatible threads violates every engineering standard in the book, and makes it very likely that the installation will fail the aforementioned 500 lb. 30 second test. Ideally, the seacocks themselves, as well as the installation, should be ABYC compliant, and the valves themselves stamped, or embossed with an ABYC H-27 or UL 1121 Sea Valve approval .

At first glance these two seacocks may look similar, however, they are dramatically different, and only one (top) fully complies with ABYC Standards.

Beyond seacocks, plumbing used for raw water applications, engine and genset cooling, air-conditioning systems, wash-down and watermakers, should be robust and reliable. The list of

raw water materials that I would approve of is relatively short, bronze (and never brass), glass reinforced nylon (Forespar's Marelon and TrueDesign are two common brands that utilize this material), fiberglass and 316 stainless steel. With rare exceptions, PVC should not be used for conveyance of raw water, particularly pressurized raw water, wherein a failure would result in flooding. Exceptions include air-conditioning systems engineered by air-conditioning system manufacturers (and not modified thereafter), as well as plumbing supplied with water makers. For all its above the waterline durability, stainless steel can prove problematic when used in seawater applications. I have seen, and photographed, countless crevice corrosion-related failures in both 304 and 316 grades of stainless steel, in both welded tubing and cast pipe components. Any signs of leakage or rust on stainless steel raw water plumbing are worrisome.

The range of metals that are suitable for seawater applications is comparatively narrow. Using the wrong metal,

like this brass elbow, can lead to flooding or worse.

Hose used for raw water should be specifically designed for the application, which means the manufacturer of the hose approves it for use with seawater. There is a wide range of manufacturers of approved raw water hose, much of which will be marked “SAE J2006R Wet Exhaust”. Be wary of clear hose when used for raw water applications, even when reinforced with a spiral wire. The vast majority of clear hose is PVC-based; it lacks the necessary robustness, chafe and crush resistance required for this role. Finally, raw water plumbing should be selected, designed and installed in such a way as to be rugged. It must be well supported and protected. While ABYC is mute on the subject once the plumbing progresses beyond the seacock, my own criteria is simple enough, if it’s not robust enough to stand on, then it’s not robust enough.

10. Warranty Coverage

For new vessels, warranty coverage, and how it’s administered, should be an important part of your decision making process. This is especially true of manufacturers who do not possess dealer networks. Warranty periods vary from manufacturer to manufacturer, one year “bumper to bumper”, covering everything that isn’t covered by individual equipment manufacturers, is common and the minimum, while two years is preferable. “Structural” which may include hull, cabin, cabin, deck (decks, including teak, are sometimes excluded) and gelcoat/paint warranties should be no less than five years, and they should include coverage for osmotic blisters. Gelcoat cracks and crazing are also often excluded, and “blisters” may be defined by the manufacturer as being recognized as a defect only if larger than a given size and depth.

Gelcoat defects and water penetration should be covered under

vessel manufacturer warrantees, both above and below the waterline, for at least five years.

Ask for a copy of the warranty policy and be sure to read it in its entirety, make sure you fully understand the coverage details. Ask questions. What happens of you have a failure and you are hundreds or thousands of miles from the dealer/manufacturer? Will you be charged for travel and lodging if manufacturer personnel must come to the boat to carry out repairs? Are you expected to transport the vessel back to the builder at your own expense, and can they keep it for an indefinite period to carry out repairs; will they charge you for storage? Will registering the vessel as an LLC have any effect on the warranty coverage? Will performing your own maintenance void your warranty? Can local professionals carry out repairs with approval from the manufacturer, and if so, will the manufacturer pay them directly, or are you expected to do that and then be reimbursed? (Always get approval from the manufacturer, in writing, before having anyone other than a dealer carry out warranty repairs). Do the warranty periods for gear that is installed in the vessel begin when you take possession, or when they are shipped from their respective manufacturers (the latter is not unheard of)? If the latter, the warranty may be expired by time you take delivery of the vessel. Are the appliances covered by their respective manufacturers for use aboard a motor or sailing vessel?

Better boat builders will begin all warranties upon delivery of the vessel to you, even if they have to provide coverage themselves. If you have a warranty claim for a component supplied and installed by the boat builder, a crane, air-conditioning system or engine/genset, the expectation is you will go directly to that manufacturer, however, if necessary, will the boat builder assist you and act as your advocate? They should, it’s likely they have far more pull with the equipment manufacturer than you do, especially if they

selected and purchased the part. Confirm that the primary warranty is provided and administered by the boat builder themselves, rather than a third party warranty company. While some are reputable and honest, many third party warranty providers have marginal records at best. If the primary warranty for the vessel you are considering is served by a third party provider, research the company and read the user reviews. If an extended warranty is offered for the vessel or engines, the same caveats apply, confirm who is providing it; again if it's third party then check their references. Extended warranties for diesel engines, particularly those that are larger and/or more complex, including pod drives, are often well worth the expense, provided they are backed by the manufacturer directly, or a highly reputable third party provider; once again for the latter it's a case of caveat emptor.

With some caveats, extended warranties for larger, electronically-controlled engines make good sense; be sure to read the terms of the policy.

In the case of third party or extended warranties that are purchased directly from the vessel or equipment manufacturer, make certain you will receive written proof the warranty has

been purchased; I've encountered a number of instances of extended warranties that were paid for by buyers; however, when they've attempted to make claims, often years later, it's discovered the plan was never actually purchased by the vessel builder, or dealer.

For a pre-owned vessel, is the warranty transferable? If so, doing so may require an inspection by the builder or engine manufacturer, filing of paperwork and paying a fee. Do your homework in advance, you may have a grace period to effect the transfer which, once expired, may leave you adrift where warranty coverage is concerned.

Finally, ask the selling broker the following questions, prefaced with, "To the best of your knowledge…"

Has the vessel ever sunk, or swamped, or has flooding reached machinery? Has the vessel been involved in a collision or grounding that required haul-out for repairs to the hull or running gear? Has the vessel ever been struck by lightning or suffered a fire beyond the stove top? A sinking should be disclosed in listings; and yet it's often omitted. Other

items related to flooding, fire and lightning should at least be disclosed by the seller early on in the discussion process, certainly before you travel to the vessel for a viewing. Never the less, if this information is not volunteered, ask.

Recently a client asked me to travel to Europe to evaluate a vessel. He had been in discussions with the seller for several months, and had visited the vessel in person, as well as reviewing reams of documentation regarding vessel maintenance. Days before the scheduled inspection he came across receipts relating to work that had been carried out on the vessel, written in a foreign language, which he just so happened to speak. He determined that the vessel had been re-powered (previously disclosed by the seller) and that the engine that was used did not comply with EU, US or Canadian emissions regulations (not disclosed and probably unknown to the seller), it lacked the all-important emissions certification decal. This seemingly small detail eventually scuppered the deal, as the buyer, if he proceeded, would have risked not being able to import the vessel into the US or Canada.

In yet another engine-related case, while inspecting a late model vessel, I noticed a few small details on one of the two engines (and the vessel itself) that led me to believe it had been replaced. I checked the hour meters and surprisingly they were the same. After posing a few questions it became apparent that one of the engines had been replaced under warranty, however, the ECU had not been replaced (not unusual for a short-block replacement), thereby retaining the original engine's hours (ECU's are typically matched to an engine's by serial number, so this can be checked). This scenario meant one engine was under warranty and one wasn't, even though the hours were seemingly the same, but in fact were not. The bottom line is, ask questions; while sellers are supposed to disclose information of this sort, they sometimes need to be prompted.

Ultimately, all of the above-mentioned pre-offer tasks can usually be accomplished with no more than a day or two of effort, most of which without ever setting foot aboard the vessel.